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all mountain streams north of the latitude of Buenos Aires and sporadically in the lowlands."

Though the monograph is intended primarily to give a systematic survey of the fishes included, the writer's interesting style makes many parts very entertaining for the general reader.

A. S. Pearse

THE PARIS ACADEMY OF SCIENCES

The recently issued *Annual of the Académie des Sciences* for 1919[1] records the election of fourteen new members in 1917 and 1918, seven in the former, and the same number in the latter year; none had been chosen from January 19, 1914, to February 26, 1917, an interval of over three years. Of these new members three belong to the section *Géographie et Navigation,* Ernest Fournier, Robert Bourgeois and Louis Fave; two enter the section *Botanique,* Henri Lecomte and P. A. Dangeard; one is credited to the section *Minéralogie,* Émile Haug; one to the section *Médecine et Chirurgie,* Edouard Quénu; one to *Économie Rurale,* Emmanuel Leclainche, and one to the section *Mécanique,* Gabriel Koenigs. In addition there are three chosen for the new division *Applications de la Science à l'Industrie,* namely, Maurice Leblanc, Auguste Rateau and Charles Charpy, and also one new non-resident member, Charles Flahault, of Montpellier. Last, but not least, Marshall Ferdinand Foch was elected *Académicien Libre,* on November 11, 1918, the day on which took place the signing of the armistice between the Allies and the Central Powers, one of the great events of history, and one to which the masterly military leadership of Foch had chiefly contributed.

It is worthy of note that an institution so thoroughly imbued with the most ardent patriotism still retains on its rolls the name of one German as *Associé Étranger,* namely Simon Schwendener of Berlin. There are also nine German *Correspondents* and two Austrians, one of these the great mineralogist, Gustav Tschermak. This shows that whatever may have been the animus displayed by individual scientists in both camps, this great institution, though placed in the vortex of the fearful conflict, did not lose the conviction that science is international and eternal.

In the *Annual* is given an imposing list of the prizes adjudged annually, or at longer intervals, as well as of the special foundations or funds, and also of the medals regularly awarded. Here we have details regarding 94 different prizes, 10 foundations or funds, and 3 medals, the "Arago Medal," last awarded in 1887, the "Lavoisier Medal" of which the last award was in 1900 and the "Berthelot Medal" that has not been adjudged since 1902.

The president of the Académie des Sciences for the present year is M. Louis Guignard, the vice-president being M. Henri Deslandes. As it is an invarable rule that the vice-president succeeds to the presidency in the following year, M. Deslandes will be, if still living, the next president. The perpetual secretaries are M. Alfred Lacroix, elected in 1914, for the department of *Sciences mathématiques,* and M. Émile Picard, elected in 1917, for that of *Sciences physiques.*

K.

[1] "Institut de France, Académie des Sciences, Annuaire pour 1919," Paris, Gauthiers-Villars et Cie, 178 pp, 8vo.

SPECIAL ARTICLES

SOME PHYSICAL IMPROVEMENTS IN NATIONAL ARMY MEN UNDER MILITARY TRAINING[1]

At the present time when the interest of the country is focused on the military policy of the future, it is worth while to record the effects of training on the physique of men who enter the army from civil life. This has been done before in the case of recruits and university men, and data secured from the men who trained for the present conflict constitute interesting material for comparison. It is a matter of common knowledge that civilians usually show an increase in weight and a generally improved condition after a

[1] From the Section of Food and Nutrition, Medical Department, U. S. Army.

period of military training, and the information here given simply reduces this well-known fact to a quantitative basis. Some of the measurements from which this material was derived were made by officers of the Division of Food and Nutrition of the Medical Department, U. S. A., in the course of investigations of the army mess in camps in the United States; the remainder were secured from records of physical examinations at the time the men entered the service. The conditions under which all the measurements were taken were such that no great accuracy can be claimed for them; however, as they were made on a considerable number of men, at various times, and by different persons, such errors as exist will in all probability be compensating.

The first study to which attention will be called was made on the weights of the men of three companies at Camps Dodge, Funston and Grant, respectively, approximately four months after the men had enlisted. At this time, the weights of the soldiers in these companies were secured by Captain Leon A. Congdon, one of the field officers of the division. The original weights of the men, as noted above, were obtained from records of physical examination made at enlistment. The results of Captain Congdon's work are shown in Fig. 1 in the form of distribution graphs. The weights were divided for plotting into groups differing by five pounds, and the number of individuals in each group was noted. Abscissas on the graph represent successive groups increasing in weight toward the right

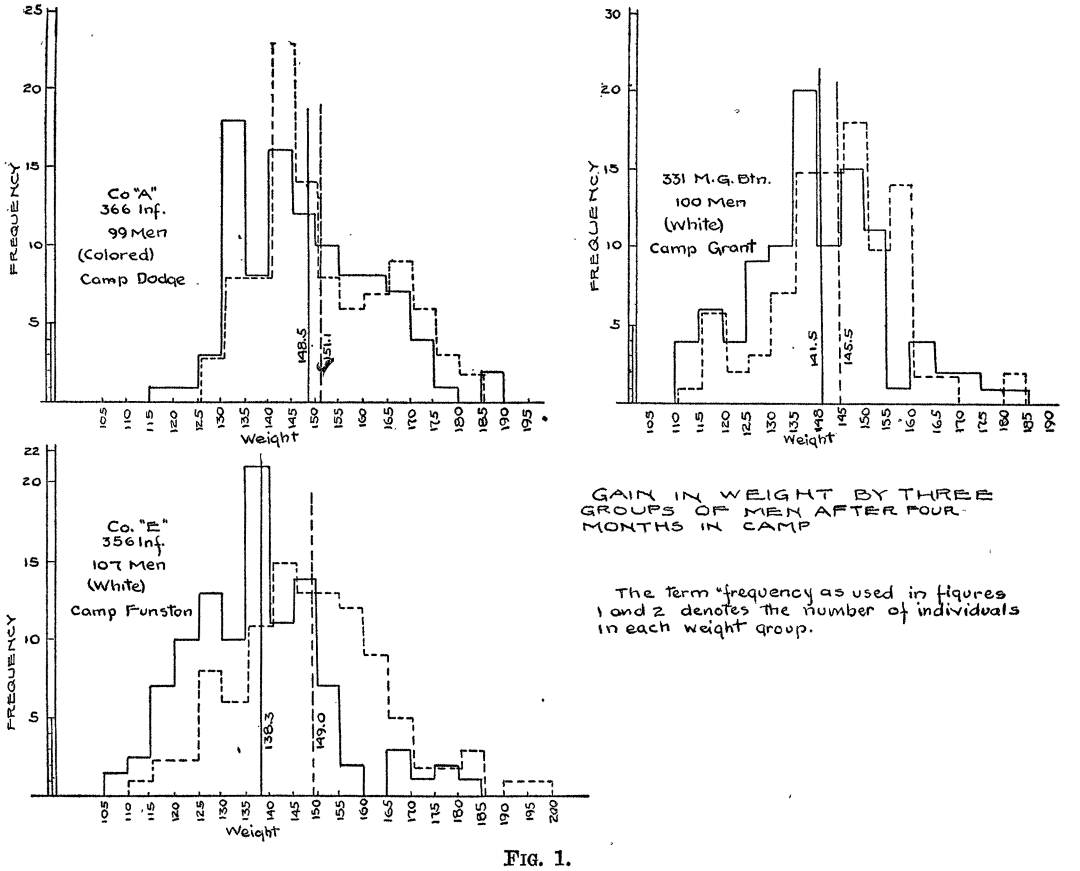

FIG. 1.

and ordinates show the number of men in each group. The number of men in the various weight groups at the time of enlistment is shown for each of the organizations as a solid line while the distribution of weights of the same men after four months is shown as a dotted line. Corresponding averages of the two sets of weights for the three organizations are similarly indicated. It will be noted that the average gain was 2.6, 4.0 and 10.7 pounds for Company A, 366th Infantry, 331st Machine Gun Battalion, and Company E, 356th Infantry, respectively.

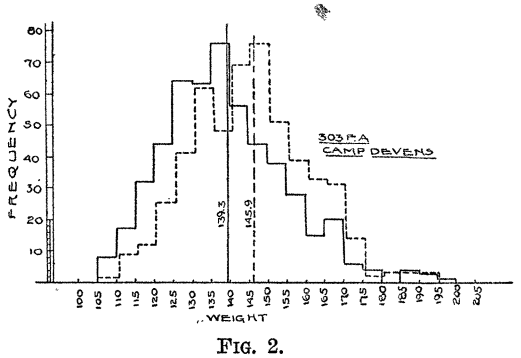

FIG. 2.

A second study of a similar kind was made at Camp Devens by Lieutenant Thurlow C. Nelson under the supervision of Captain J. Garfield Riley on the 303d Regiment of Field Artillery. Fig. 2 shows the distribution graph of the weights of 523 men of this regiment at enlistment and approximately six months later. For the men of this group, chest and height measurements were taken as well as weight. It was found that the height of the group remained approximately stationary, but that chest motility increased on the average 0.7 inches during the five months of training. The increase in motility is considerable, representing as it does a 23 per cent. gain over the average of the men at enlistment.

A third study of gain in weight was made by Lieutenant Wm. A. Perlzweig, Sanitary Corps, on recruits at Camp Pike. A group of National Army men, 257 in number, was selected for study during their first weeks in camp. The typhoid prophylaxis was given in the first two weeks. In the third week the men were divided by the camp authorities into Class A men and Class B men. Class A consisted of those in good physical condition. This class was put at once on a hard training schedule to fit the men for overseas service in the shortest possible time. Class B included men who on account of minor physical defects were continued on the light training schedule that the entire group had formerly undergone, until their defects could be remedied or their classification for limited service branches of the army could be effected. In addition to recording weight changes of these recruits, their average food consumption per

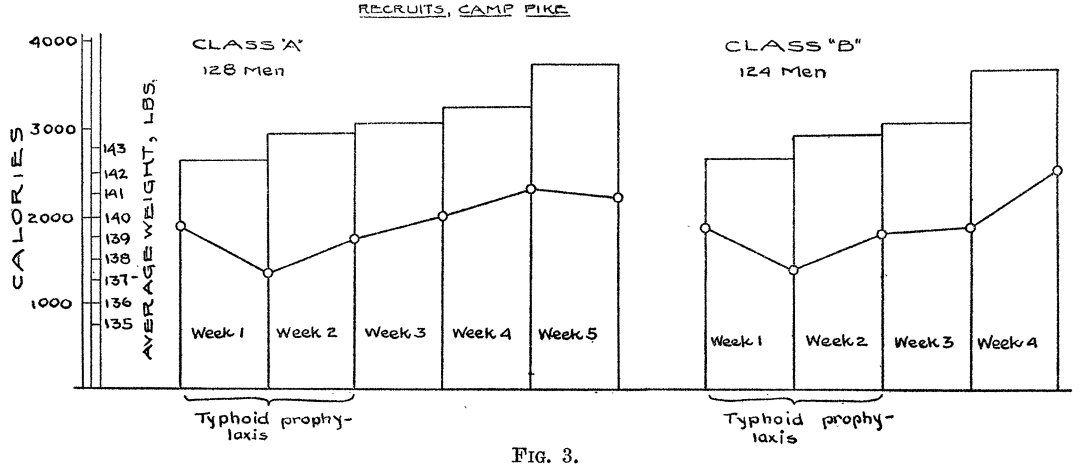

FIG. 3.

week was determined. The investigation covered the first five weeks after enlistment for Class A and the first four weeks after enlistment for Class B, at the end of which periods it was found necessary to discontinue the study. Fig. 3 shows graphically the results obtained. The average energy value per man per day of the food consumed during each week is represented by a series of blocks. The average weight per man was measured at the beginning of each week and at the end of the last week and is shown as a solid line. The scales on which the two quantities are plotted are shown at the left. The noteworthy features of the study are the drop in weight during the first week, in part presumably a result of the typhoid prophylaxis, and subsequent rise for both groups of men resulting in a net increase of 1.4 pounds per man for Class A for a five-week period and 2.6 pounds per man for Class B for a four-week period. The consumption of food in the mess shows a very large increase in both cases. In examining Fig. 3 it should be borne in mind that up to the beginning of the third week the group of recruits had not been divided into Class A and Class B.

It is of interest to compare the averages for these studies with similar averages made in the past. Before doing this it should be stated that all of the groups reported here average approximately 68 inches in height in their stocking feet, and were approximately 25 years of age. All were National Army men, secured by draft from civilian life. The average weight for civilians of this height and age has been determined to be 145 pounds in ordinary clothes.[2] As the army examination uses stripped weight a deduction must be made for the weight of the clothes. Assuming six pounds as the probable value of this, 139 pounds may be taken as the stripped weight of civilians 68 inches tall. According to this standard the men of all the organizations except Company A, 366th Infantry, were about normal in weight at enlistment. In ordinary times recruits for the regular army are drawn chiefly from the laboring classes and show an average weight of approximately 147 pounds for the age and height of the groups here studied.[3] The difference of seven pounds in the average weight of regular army recruits in peace times and these National Army men is probably a result of the changed character of the army due to the draft. It will be noted that Company A of the 377th Infantry consists of colored men; the average weight of these men at enlistment is practically that of the average peace time recruits for the regular army. Also the average rate of gain in weight of this organization is less than in any other of those here studied. With the one exception just noted, all of these National Army men, although they closely approximate the normal civilian weight, made a considerable gain under the rather strenuous training régime of the camp. There is no doubt that this is a gain almost entirely in muscular tissue. A weighted average of the increases made by the three companies shown in Fig. 1 and of the men of the 303d Field Artillery gives 6.4 pounds as the mean increase in body weight for the men of the four organizations. The average weight of these men *after training* (146.8 pounds) is about the same as that of the average peace time *recruit* (145.1). According to Munson the peace time recruit, who is undoubtedly a much more robust type physically than the National Army recruits, gains about 2.8 pounds as a result of three and a half months of military training and the gain of 6.4 pounds of the National Army men is thus not at all surprising. The twenty-three per cent. increase in chest motility shown by the men of the 303d Field Artillery is scarcely second to their weight increase as an index of improvement in physical condition. The men of this regiment showed an average motility at enlistment of three inches. This is a little higher than that shown by the

[2] "Medico-actuarial Mortality Investigation," Vol. I. Association of Life Insurance Medical Directors and Actuarial Society of America, New York, 1912.

[3] "The Theory and Practise of Military Hygiene," E. L. Munson, New York, William Wood & Co., 1901.

TABLE I

Group	Length of Training Period	Original Weight Lbs.	Weight After Training, Lbs.	Gain, Lbs.	Motility at Enlistment, Inches	Motility After Training, Inches	Gain, Inches
Peace time recruits to Regular Army at Columbus Barracks	3½ mos.	145.07	147.88	2.81	2.804	3.410	0.606
Civilians (men 68″ tall and 25 years old)	——	139					
523 men of 303 F. A.	6 mos.	139.3	145.9	6.6	3.00	3.70	0.700
99 men (colored) Co. A, 366 Inf., Camp Dodge	4 mos.	148.5	151.1	2.6			
100 white men, 331 Mch. Gun Bn., Camp Grant.	4 mos.	141.5	145.5	4.0			
107 men (white) Co. E, 356 Inf., Camp Funston.	4 mos.	138.3	149.0	10.7			
Class "A" Recruits, 134 men, Camp Pike	5 wks.	139.54	140.94	1.40			
Class "B" Recruits, 123 men, Camp Pike	4 wks.	139.50	142.07	2.57			

group of regular army recruits mentioned by Munson, whose motility at enlistment averaged 2.8 inches. The regular army recruits increased 0.6 inches in motility as a result of three and a half months' training, while the 523 men of the 303d Field Artillery showed an average increase of 0.7 inch in five months.

The recruit study at Camp Pike indicates the relation between gain in weight and food consumption. It is of course obvious that without proper feeding physical improvement of the men is greatly retarded no matter how favorable other conditions are. It is possible, however, with conditions as they exist in the army, to feed men very satisfactorily from a nutritional point of view and at the same time very economically. A consideration of the remarkable physical gain outlined above of men in the 303d Field Artillery, taken in conjunction with the regimental waste record, shows this very conclusively. During the week of the survey made in order to determine the food consumption of the men of the regiment there was no waste of edible food. This means that every man left the table with an empty mess kit, and that all left-overs from the kitchen were utilized in subsequent meals. While such a remarkable record is exceptional, mess economy in this regiment was at all times of a high order. The beneficial effects of the discipline necessary to secure such results will probably never be lost by the men who were in the organization. The average energy value of the food consumed per man per day in the 303d Field Artillery was 3,699 calories, a figure typical of the consumption found in army messes generally.

RECRUITS, CAMP PIKE

Class	Weight, Average					
	July 1	July 7	July 13	July 20	July 28	Aug. 4
A (134 men)	139.54	137.69	138.93	140.02	141.46	140.94
B (123 men)	139.50	137.78	139.20	139.55	142.07	——
	Food Consumption, Calories per Man per Day					
	July 1–7	July 7–13	July 13–20	July 20–28	July 28–Aug. 4	
Class A	2,640	2,931	3,085	3,227	3,715	
Class B	2,640	2,931	3,085	3,675	——	

The material discussed in the above paragraphs is summarized in Table I. It should be said in closing this article that the *typical* army mess furnishes a sufficient amount of nutritious well-cooked food to meet the requirements of the average soldiers. This is supported by such evidence as has been adduced above and obviously also by the fine army turned out in the training camps of this country for service overseas.

F. M. HILDEBRANDT

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